

# **Voice Over IP Whitepaper, Gareth Senior, CTO, Axiom Systems**

## **Voice Over IP: What Lies Beneath**

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### **Introduction to Voice Over IP**

Voice over IP (VoIP) is the term used for the two-way transmission of voice traffic over a packet-switched IP network.

VoIP traffic can be carried on a private managed network the public Internet or a combination of both. Some organisations use the term 'IP telephony' interchangeably with 'VoIP'.

This widely used application, appeared in the mid 1990s with services that enabled Internet users to make free calls between specially equipped PCs, or between a phone and an equipped PC. Since then the application has greatly improved – voice quality on managed IP networks can now match that of the public voice network.

There are two main types: Corporate VoIP and Residential Voice over Internet (VoIN)

### **What is Voice Over IP used for?**

It is particularly useful for enterprises who already operate an IP network, where huge savings can be made by using the corporate IP network to carry voice as well as data traffic

The benefits include cost saving on phone bills, maintenance (one system rather than two), phone links to diaries etc on a computer, making things easier and more convenient for employees.

It can also be used by residential users, as it is very cheap for contacting friends and family abroad for example, where phone rates are much higher than an internet connection – when on holiday or travelling. This is usually termed Voice over Internet rather than VoIP. Since broadband services have improved and Internet bandwidth has become more reliable, so carrying voice over Internet has become smoother and of a higher standard than ever before.

### **How does VoIP Create Cost Savings?**

Traditional circuit-switched telephone networks were designed to carry voice traffic. However, because circuit-switched networks reserve an entire channel

for each conversation (even when no-one's talking), they do not use the network's available bandwidth in the most efficient way.

However if packet technologies, such as Frame Relay, ATM or IP are used to transport data, they can interleave bits and bytes of traffic from many users on shared facilities, using the network's bandwidth more efficiently.

Now IP offers the same performance offered by standard telecoms operators, it can provide major benefits to both Service Providers and enterprises.

- It can lower capital and operating costs by converging separate voice and data networks into a single multi service network.
- It can increase revenues for Service Providers by raising the value of voice service, with new applications such as video calling, unified messaging and Web-enabled multimedia call centres. With multiple services available on a single customer link, providers have lots of opportunities to bundle, cross-sell and up-sell services
- It can enhance productivity with new applications such as unified messaging which can enable employees at any location to work more effectively as teams and to be more productive.

It is estimated that new IP telephony and VOIP consulting and integration services can help organizations save up to 30% on network costs via lower management, bandwidth and application integration costs.

### **What services and opportunities does it offer?**

VOIP can offer reduced maintenance costs, which is a big factor, particularly in a large organisation. This is because the system will be the same for both data and voice and will not require separate engineers. If an equipment gateway is added to their PBX then staff can still use their phones rather than dialling on a PC, while having the advantage of being able to dial any employee worldwide with only 4 or 5 digits at no extra cost. Many companies now see this is a valid alternative to their legacy systems.

In a corporate environment the new services can also help increase productivity, flexibility and customer service through new applications such as Unified Messaging, IP based Customer Relationship Management and IP based contact centres.

One of its most useful features is that it now makes it possible for large organisations to have unified messaging systems which deliver email, faxes and voice mail all on a single webpage. Vendors such as Cisco, Alcatel and Nortel are currently leading the way with high sales figures for VoIP software and equipment. Many large international corporations such as Merrill Lynch, are now installing VoIP having realised the benefits it brings and using it as part of their expansion strategies as it can rapidly reduce costs on long distance calls.

Traditionally the service of offering pre-paid calling cards available to fixed telephone customers has been at relatively high rates. However, it is becoming more common (particularly in the US) for this to be done much more easily on Voice over IP systems, which has the advantage of being less costly. Companies such as Onetel might allow you to use a standard mobile or household handset but the back office is likely to use VoIP. So the call is processed on a local line as voice, then digitised and sent over an IP network, and then converted to voice at the other end on the local network. The advantage is that VoIP has no geographic boundaries unlike the old tariff borders, which can be confusing and problematic and therefore more expensive.

One of the main drivers is the fact that fixed lines need to come up with a way to compete against the mobile market, which is said to be causing a decline in the number of fixed lines. Packetised telephony is the best way to do this because of its scalability and reduced cost.

### **Are there any disadvantages?**

Unlike E-mail traffic, VoIP traffic demands real time dedicated bandwidth for an allotted time.

To support VOIP traffic consistently and in a reliable way, a network needs to provide the following:

- High performance
- Low latency/delay
- Protection
- Quality of Service

Most of the initial problems that were experienced in the early days of VOIP have been ironed out with increased bandwidth.

### **What do Service Providers need to be able to efficiently provision orders for a service such as Voice over IP?**

Service Providers need hardware vendors who can lay the network foundation and then software vendors to install revenue generating services such as VoIP.

Services such as VoIP, can be surprisingly complex with a number of suppliers for different hardware items and many different steps to be taken before the service can be implemented properly which can often take many months.

A good Operational Support System (OSS) provisioning backbone is vital to provide good workflow management, inventory management and to make sure each part of the process is fully activated. It is also highly beneficial to

the Service Provider if each system is fully integrated with the others to prevent the need for time consuming and expensive systems integration.

A typical step-by-step order process would be as follows:

1. Take order
2. Break down order into constituent parts.
3. Check inventory and network capacity - if there is sufficient capacity proceed to next step. If no, automatically raise Purchase Order and following, approval place order with network equipment supplier
4. Configure/Activate all network elements required to fulfil order
5. Update inventory with details of the new customer, network elements and the new VoIP service being subscribed to
6. Update billing, and automatically send bill
7. Send welcome pack to new customer

This whole procedure can be time consuming, inefficient and costly unless well provisioned. Automation is a key factor in speeding up the process, which also reduces manual error, a factor which can be very costly.

In today's environment there is lots of competition for bandwidth due to many bandwidth hungry applications, particularly corporate services such as VoIP. Quality of Service (QoS) is a particularly important issue with VoIP due to the fact that unless data is prioritised then there is more chance of voice quality being distorted.

This means that Service Providers need software such as Multi-Protocol Label Switching (MPLS), which can ensure QoS. MPLS, a technology that allows network architects to handcraft traffic patterns to meet their specific needs, is expected to be readily adopted by users as networks carry increasing volumes of mixed traffic. As the process gets more complicated, and additional software and applications are involved, a good OSS backbone is even more essential. A solution comprising workflow, inventory management and activation can ensure that not only are voice packets prioritised but that all the surrounding services and applications are automated.

Service Providers not only need a solution which prioritises workflow automatically, they also require one which can give them visibility of what is happening and where it is taking place so that they can ensure that quality is at its best at all times. To do this, an OSS solution needs to have a two way connection with the network so that it gets real time information and is able to act on this information immediately; in a mission critical environment staff need to be able to deal with errors as they occur, preventing overload of the network and bottlenecks, which ultimately cause customers to switch Service Providers, particularly if they have repeat problems.

## **What lies ahead**

VoIP is set to become much more widespread, especially amongst large corporate companies during the next two years due to the fact they can create substantial cost savings. Service Providers are starting to realise that it is one of many revenue generating services which they are currently starting to push – BT for example is one of many who offer a managed, fully hosted and end-to-end IP application solution. However Service Providers would also be wise to implement a strong OSS solution to operate alongside their offerings to improve functionality, quality of service and to ensure revenue is maximised by an efficient billing process. Without an efficient workflow solution, orders can end up mislaid, delayed and ultimately cancelled if the customer does not end up with the product or service delivered on time.

Service Providers and enterprises now agree that the network of the future must offer combined voice and data communications over a single integrated platform built on packet technology. IP, the packet technology used on the Internet, has proven its ability to efficiently integrate voice traffic into the flow of data on IP networks, enabling voice. The majority of experts believe that by 2006, 50% of the world's traffic will be using VoIP.